Microbiology Case 66 (Nervous System Infections)

1. **Signs and symptoms for the disease it produces**.

Constipation, **inability to nurse (infants), difficulty opening jaw**, trismus, opisthotonus, hyper-responsiveness, foul-smelling discharge from umbilical cord (infant)

1. **The source of infectious organism**.

C. tetani spores usually from soil

1. **The manner of exposure, route of infection, tissues that they reside and, where appropriate, transmission to others**.

ubiquitous in the soil and GI tracts of animals; transmission occurs via injury and trauma where wound is in contact with the soil; in infants, if the mother is not vaccinated protective IgG antibodies against tetanus will not be passed across the placenta. Some cultures like to put clay on the umbilical stump, which can have tetanus in it. I am pretty sure we learned not to belittle other cultures in CDM. .

1. **The pathology and the manner by which the particular disease develops and/or is induced, including damage caused by the pathogen and damage caused by the immune system’s response to the pathogen**.

once the toxin is synthesized, it moves from the entry site to the peripheral motor neuron terminals, enters the axon **and travels to the spinal cord**; then diffuses to terminals of neurons; **tetanospasmin is a Zn++-dependent endopeptidase, that cleaves synaptobrevin which is critical in docking and fusing the vesicle containing inhibitory neurotransmitters glycine and gamma-aminobutyric acid**. This leaves lower motor neurons uninhibited and results in muscle rigidity

ANS involvement also results in a hypersympathetic state caused by the uninhibited release of adrenal catecholamines.

1. **Methods of identification and placement into a particular biological subset**.

Mostly a clinical diagnosis. can do cultures of the umbilical stump in infants, but culture rarely grows the causative agent; gram+ rod that forms terminal spores

1. **Factors leading to enhanced resistance or susceptibility.**

The unvaccinated are at risk. In the US most cases are a result from acute injury and trauma where the wound is contaminated with soil.

1. **Other organisms in the differential diagnosis and how to discriminate among potential causative agents**.

* Dystonic reaction to dopamine blocker
* Meningitis (bacterial or viral)
* Neurologic disorder (infectious or noninfectious cause)
* Sepsis
* Strychnine poisoning

The symptoms presented here have a very limited differential in neonates. Dystonic reactions this severe would not be common and are caused by only a limited number of drugs. Meningitis would be expected to cause lethargy rather than paralysis. Need to rule out strychnine poisoning.

1. **Prevention, treatment and vaccine design (live vs. dead**).

Prevention: DTaP vaccine – 2, 4, 6 mos then 15-18 mos and then another age 4-6. Followed by routine boosters every 10 years with Tdap.

Treatment: most important to maintain the airway and intubate if necessary. A feeding tube should be place as high caloric demands are required. Benzodaizepines are used as needed to control spasms and rigidity. Beta-blockers can be used to control sympathetic hyperactivity. Passive immunization with human tetanus Ig should be administered in addition to active immunization w/ tetanus toxoid. Metronidazole is DOC bc peniciliin may act as a GABA antagonist.